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G4H HSB H1A H13D
H4F FCW FD1B9 FD30C FD30K FD40P FD42E

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(58) Field of search
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INT CL⁴ G09F, G09G, H04N

(54) LED displays

(57) An arrangement for controlling the brightness and the color of a LED display unit and for effectively assembling a plurality of LED display units 11 to a large LED display principally comprises a CPU 14, a brightness switch 17 and an address-selected switch 16. The switch 16 presets the address of respective display unit 11. In response to signals from the switches 16, 17, the CPU outputs a pulse signal of corresponding width and a data shift circuit 18 will provide the LEDs with appropriate brightness class so that all LED display units are controlled to have a substantially same brightness. Each unit 11 may be composed of a number of matrices with the pixel on each matrix formed by a single LED formed by two coloured chips.

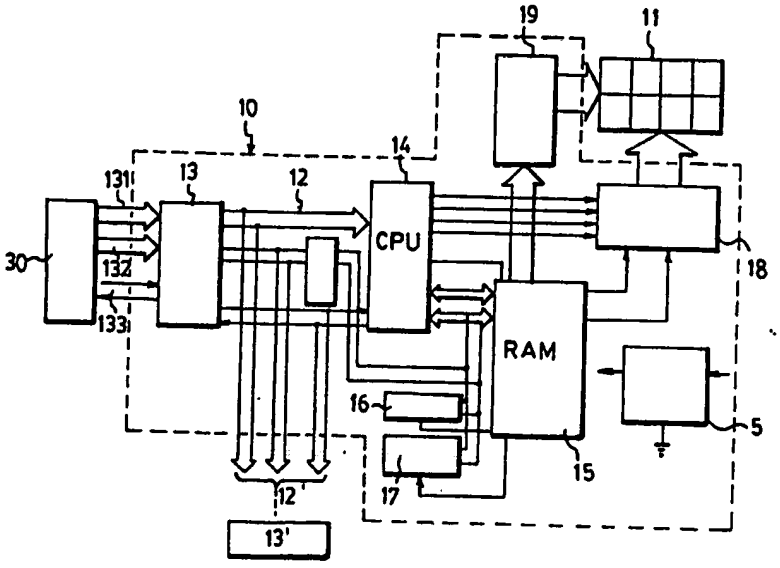

FIG. 4

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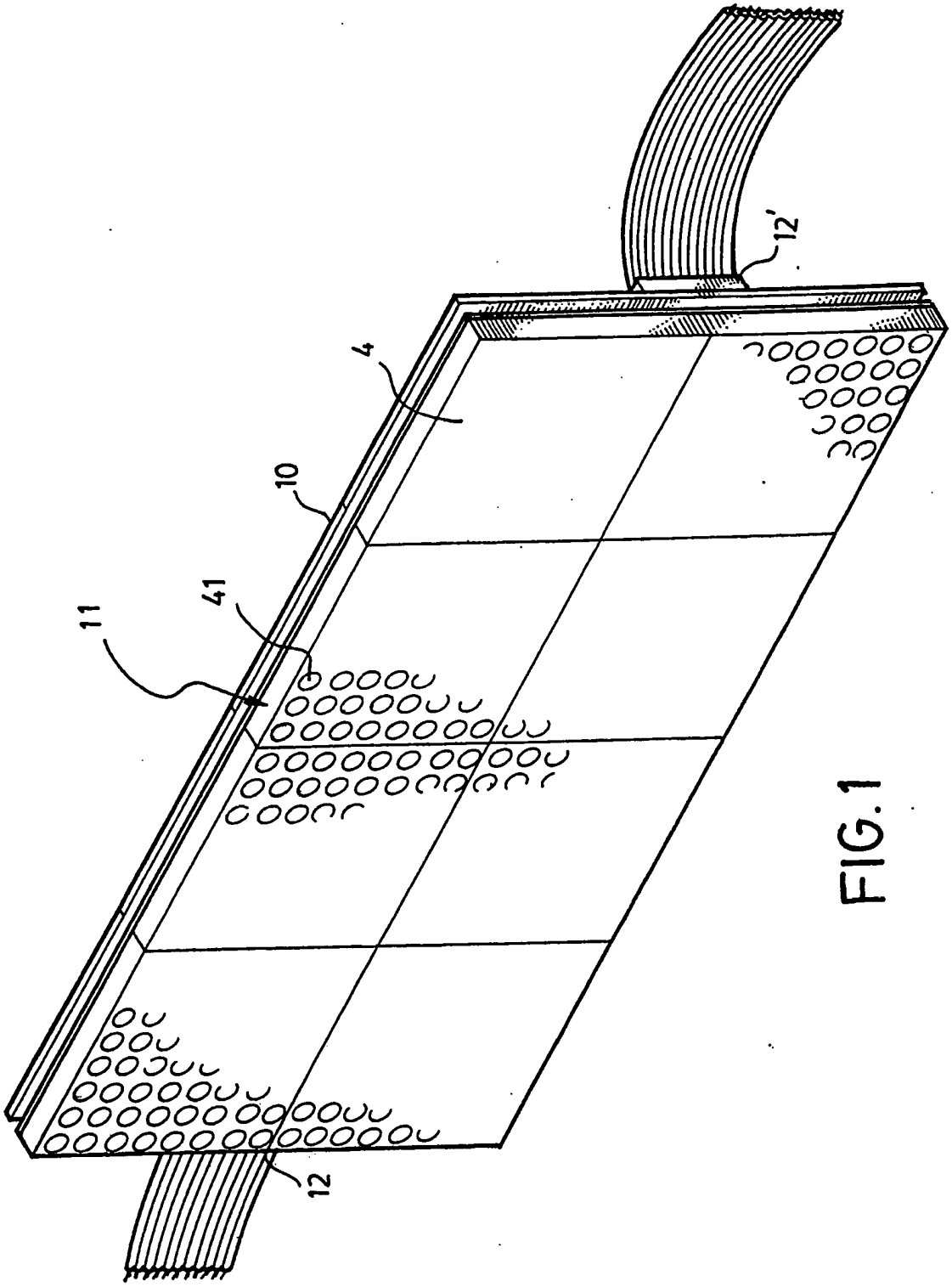


FIG.1

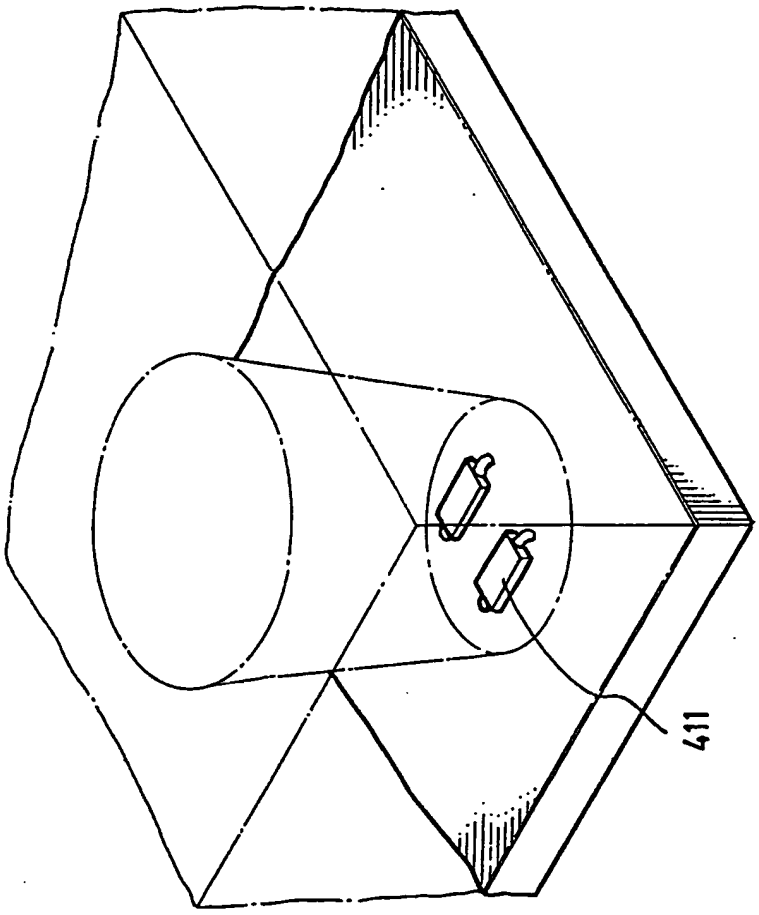


FIG. 2

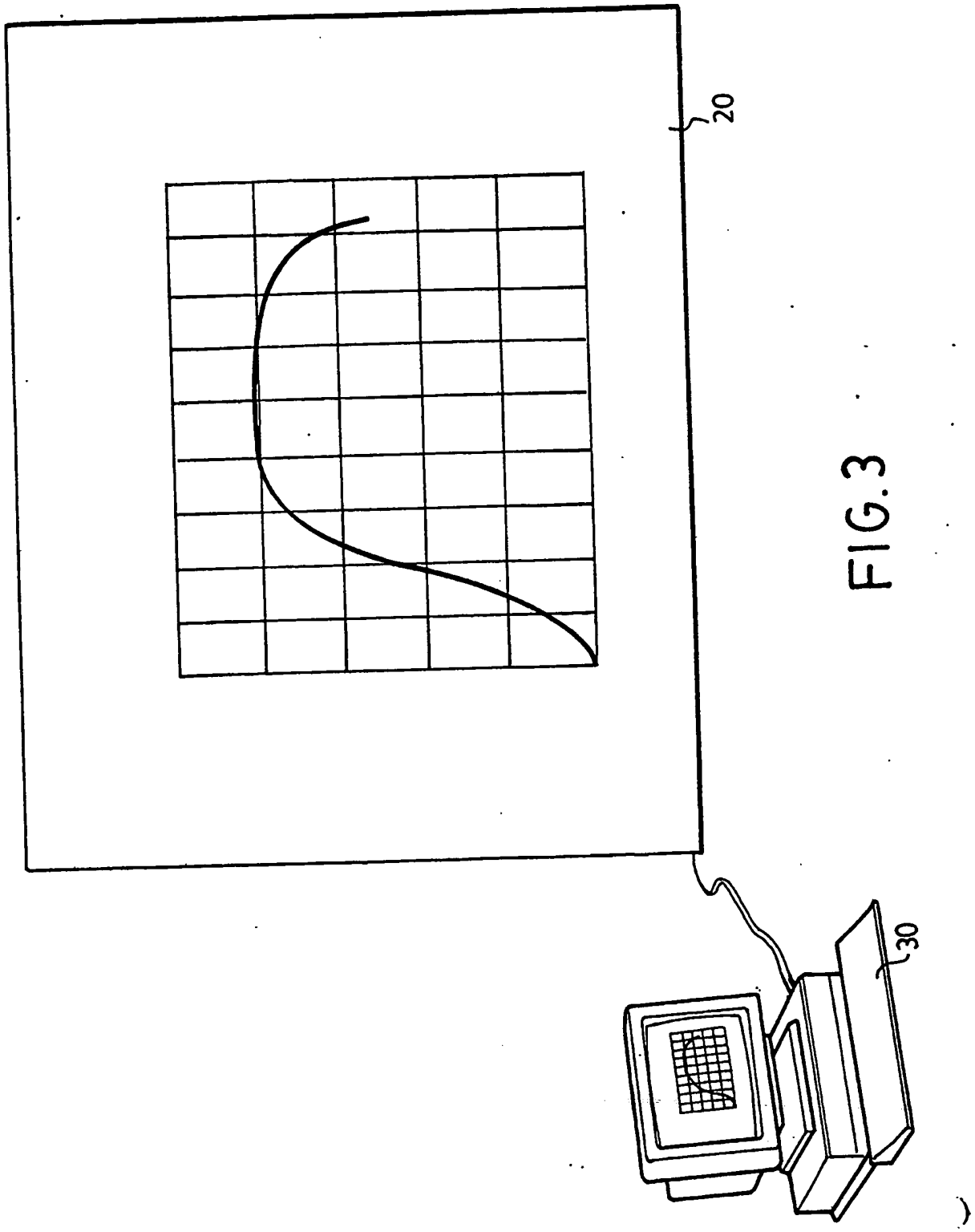


FIG.3

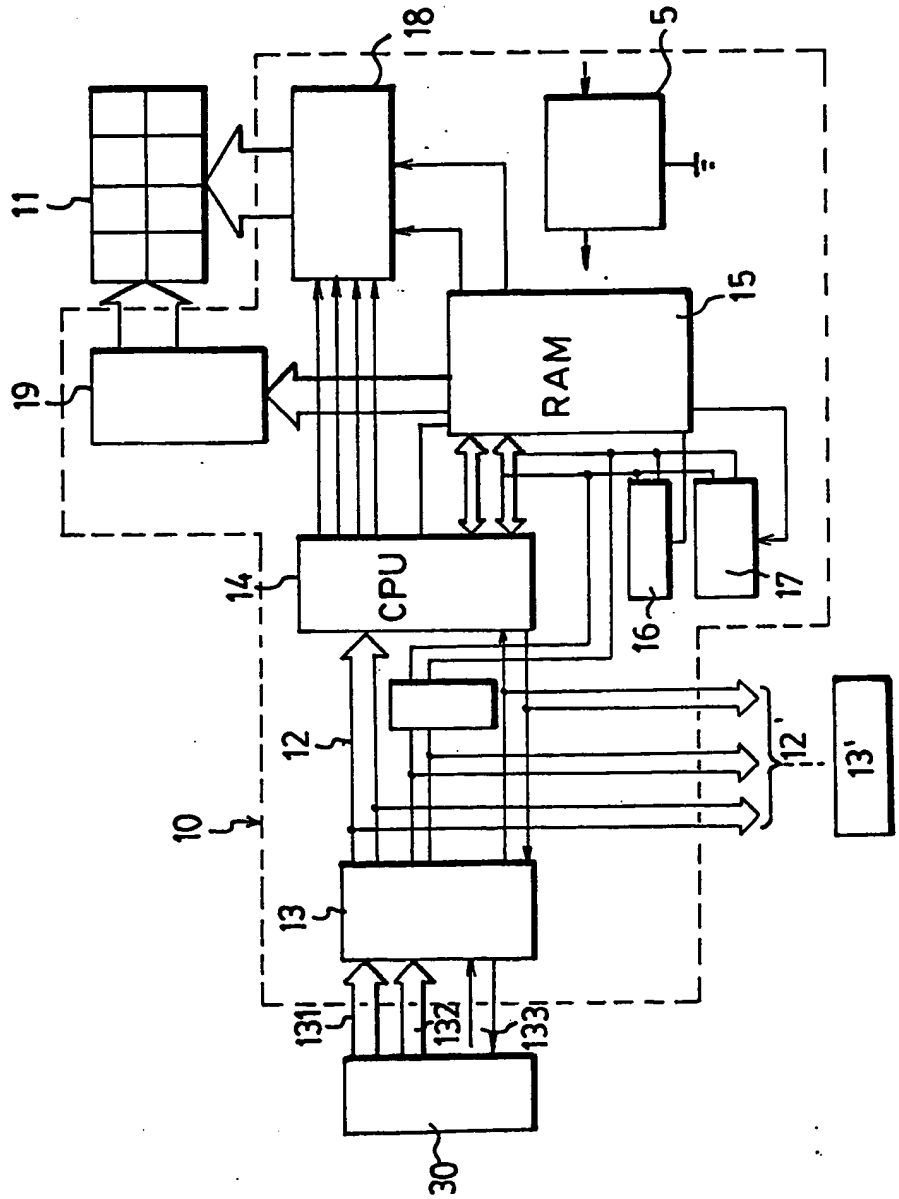


FIG. 4

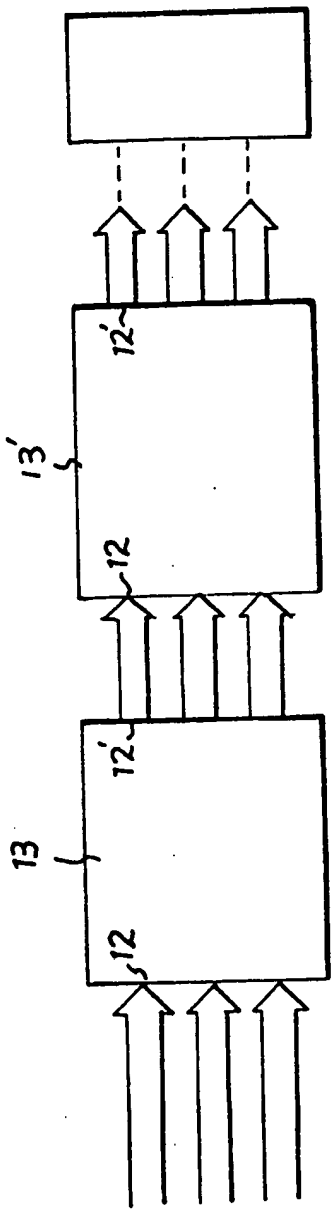


FIG. 5

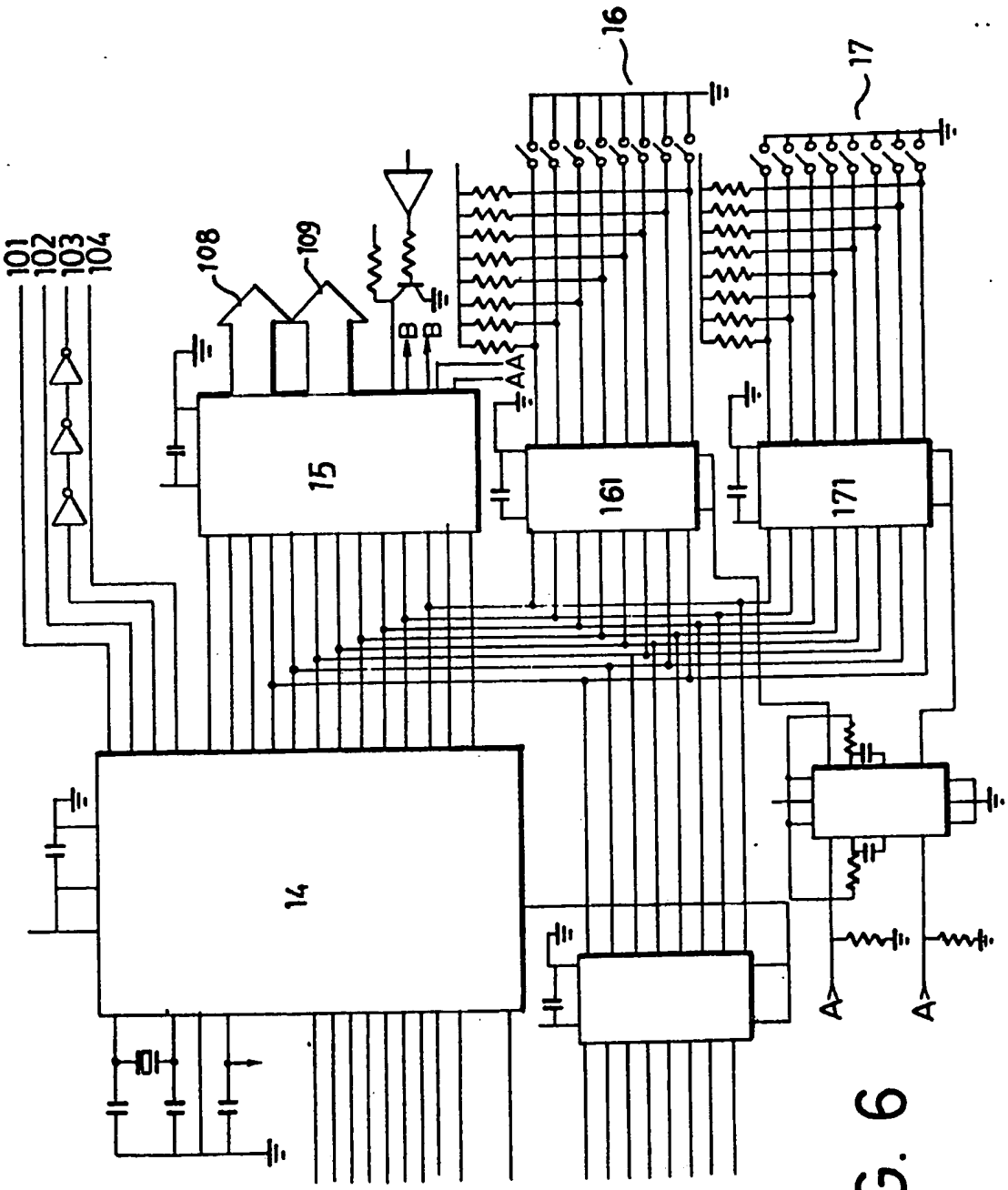
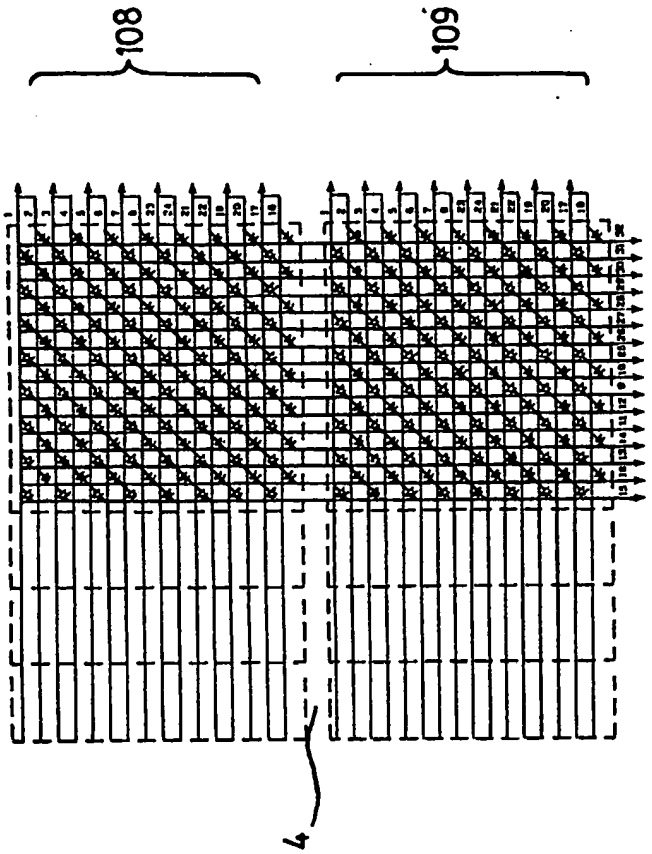


FIG. 6



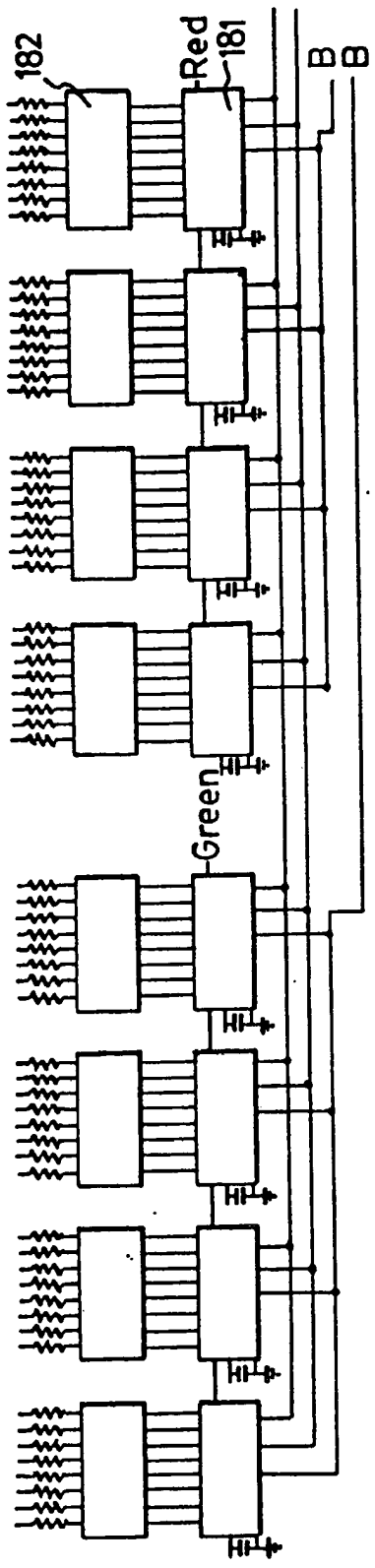


FIG. 7

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TITLE: COMBINED CONFIGURATION-CHANGEABLE AND BRIGHTNESS-ADJUSTABLE FUNCTIONAL CONTROLLED CONSTRUCTION OF A LED DISPLAY

This invention relates to a combined configuration-changeable and brightness-adjustable functional control construction of a LED display, especially to a control construction cooperated with a computer to control respective LED display unit of a large LED display so that each LED of the LED display unit or the whole LED display substantially has same brightness.

LED display now is widely used in store's display, information communication and so on. A large colored LED display may be formed of a plurality of LED display units, wherein each LED display unit is also composed of a number of matrix LED plate. As the general manufacturing process of the LED plate, there is installed two or more different colored LED chips on a desired portion of a printed circuit board and with the bright extent of respective LED chip, the color of the LED plate is determined. For instance, each LED has seven brightness classes: L, M, N, P, Q, R and S, suppose that a LED is composed of a red chip and a green one, therefore, if the red chip has M-class brightness and the green chip has P-class brightness, then the whole color of the LED is a MP-class type. According to such combination, there are at least 49 color-class types. Therefore, even if the numerous LED

plates of a respective LED display unit has same brightness, when assemble a plurality of LED display units into a large LED display, it should be time-wasting and cost-wasting because it must be pre-selecting the LED display units with same brightness and getting rid of some unfit ones.

As mentioned above, the color of the LED display unit is adjustable by controlling the brightness of respective LED chips. The conventional method utilizes different values of current to control the brightness of the LEDs, which will result in over-leakage of current and the limitation of adjustable region of brightness.

Further, it is also impractical because to produce a LED display, it should be first to determine the volume of the desired LED display, the power used for suppling and dissipating, and then to arrange a circuit with the computed conditions, and once another LED display is needed, all of the processes above are repeated again.

Accordingly, in accordance with a first aspect of the persint invention, there is provided with a control construction of the LED display unit which is cooperated with a computer via a buffer; the control construction of the LED display unit has a CPU which receives the data from the computer to configurate a drawing similiar to that of the computer on the LED

display and control the brightness and the color of the LED display unit.

In accordance with a second aspect of the present invention, there is provided with a control construction of the LED display unit which comprises a data shift circuit connected to the column of the LED display unit and a scanning driver connected to the row of the LED display unit so that once a signal is input to the CPU of the LED display unit, all of the LEDs will have substantially same brightness and the scanning driver scans desired LEDs and make them bright.

In accordace with a third aspect of this invention, there is provided with a control construction of the LED display unit wherein further comprises an address-selected switch and a brightness switch; each the LED display unit is pre-addressed, and the color of the LED display unit is determined by a pluse width picked by the CPU from the brightness switch.

In accordance with another aspect of this invetion, there is provided a a control construction of the LED display unit which has an input port and an output port so that a plurality of LED display unit can be assembled into a large LED display without re-designation.

The invention may be performed in various ways and one specific embodiment will now be described by way of

example with reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view of the LED display unit which comprises an input port and an output port;

Fig. 2 is a perspective view showing two different colored LED chip being installed together;

Fig. 3 is an embodiment of this invention showing the cooperation of a LED display and a computer;

Fig. 4 is a block diagram of the control construction of the LED display unit of this invention;

Fig. 5 show a simple block diagram of the connection of a plurality of LED display units;

Fig. 6 shows a detailed electrical circuit of the control construction of the LED display unit of this invention; and

Fig. 7 shows a serial-in and parallel-out diagram of a data shift circuit and a scanning driver of this invention.

Referring to all the drawings, especially to Fig. 1 to Fig. 3, this invention principally discloses a control construction 10 of a LED display unit 11 used to make a plurality of LED display units 11 be assembleable into a large LED display 20 and to make the assembled LED display 20 be connected to a computer 30, and via the control of the computer 30, the large LED display 20 may appears a drawing thereon similiar to that of the computer. In addition, the brightness

and color of the large LED display 20 is adjustable and controlled by a CPU 14 (shown in Fig. 4) of each LED display unit 11.

Each LED display unit 11 is composed of eight LED display plates 4 and each the LED display plate 4 comprises eight LEDs 41 a column and eight LEDs 41 a row. For showing different colored effect, each LED 41 at least includes two colored LED chips 411 installed therein (Fig. 2). In the following description, there will be embodied with a red and a green LED chips to describe the basic characteristics of the control construction 10 of this invention. An input port 12 and an output port 12' are included in each LED display unit 11 so that a plurality of such LED display units 11 may be directly assembled to a desired large LED display.

Now referring to Fig. 4 to Fig. 8, especially to Fig. 4 and Fig. 6, they respectively show a block diagram and the corresponding electrical circuit of the control construction 10 of this invention. The control construction 10 comprises a CPU 14, a RAM 15, an address-selected switch 16, a brightness switch 17, a data shift circuit 18 and a scanning driver 19. A buffer 13 connects to the input terminal of the CPU 14, which has an input port 12 and an output port 12'. The input port 12 receives the address, data and control signals from the computer 30 and the like via an address bus 131, a data bus 132 and a control bus 133.

The output port 12' output the above three signals. Therefore, to assemble a larger LED display, the output port 12'of a LED display unit is connected to an input port 13'of another LED display unit, as shown in Fig. 5. The installation of the buffer 13 also will make the current flow in the control construction 10 and the LED display unit 11 stable so that a plurality of LED display unit 11 will be assembled together without attenuation.

The brightness switch 17 and the address-selected switch 16 are respectively connected to the CPU 14 via a buffer 171 (or 161). The CPU 14 receives the signals from the brightness switch 17 and the address-selected switch 16 and a pluse wave produced according to the received signals will be output from the CPU 14 to the data shift circuit 18 via a red LED data bus 101, a green LED data bus 102, a clock 103 and a strobe bus 104, and also output to the scanning driver 19 via the RAM 15 and two scanning bus 108 and 109. As shown in Fig. 7, the data shift circuit 18 comprises eight pairs of shift registers 181 and shift drivers 182 connected to the column of the LED display unit 11 and the scanning driver 19 connects to the row of the LED display unit 10 via scanning bus 108, 109. The pairs of shift registers 181 and the shift driver 182 are so arranged in serial that all LEDs on the LED display unit 11 will substantially have same brightness.

The color of the LED display unit 11 is determined by the pluse width output from the CPU 14. As mentioned above, the combination of the red and green LED chips with different brightness classes will produce different color. The CPU 14 receives the signals of the brightness switch 17 and encodes the received signals to a pluse wave, then the data shift circuit 18 drives the red LED and the green LED according to the respective pulse width so as to produce desired color.

The address-selected switch 16 pre-sets the address of respective LED display unit 11 of the large LED display 20. The brightness of each LED display unit 11 is also pre-set by means of the brightness-switch 17. As mentioned above, the computer 30 selects desired address to bright according to the desirable drawing. It is also evident that the color adjustment by the brightness switch 17 is provided with larger adjustable region because the color is linearly changed according to respectively red LED's and green LED's pluse width. Further, it is no need to re-design a new control construction for a large display unit so as to provide a more economic effect.

As various possible embodiments might be made of the above invention without departing from the scope of the invention, it is to be understood that all matter herein described or shown in the accompanying drawings is to be interpreted as illustrative and not in a

limiting sense. Thus it will be appreciated that the drawings are examplary of a preferred embodiment of the invention.

I CLAIM

1./ A combined configuration-changeable and brightness-adjustable functional control construction of a LED display unit comprising a CPU which receives the signals of an external computer; a brightness switch pre-setting the brightness of said LED display unit and an address-selected switch pre-setting the address of said LED display unit so as to control the whole brightness of a large LED display units to be substantially same.

2./ A control construction of a LED display unit as claimed in Claim 1, wherein the row and column of said LED display unit are respectively controlled by a scanning driver and a data shift circuit with a pluse signal; said pluse signal being output from said CPU and a RAM and according to the pluse width of said pluse signal, said data shift circuit and said scanning driver controlling the brightness of each LED chip installed on the LED of the LED display unit to perform desired color.

3./ A control construction of a LED display unit as claimed in Claim 1, wherein further comprises a buffer connected to said CPU; said buffer having an input port and an output port wherein said output port is connectable to an input part of next LED display unit so that a large LED display is

assembled by a plurality of LED display units.

4./ A control construction of a LED display unit as claimed in Claim 1, wherein said brightness switch and said address-selected switch are respectively connected to said CPU via a buffer.

5./ A control construction of a LED display unit as herebefore described with reference to the accompanying drawings.

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